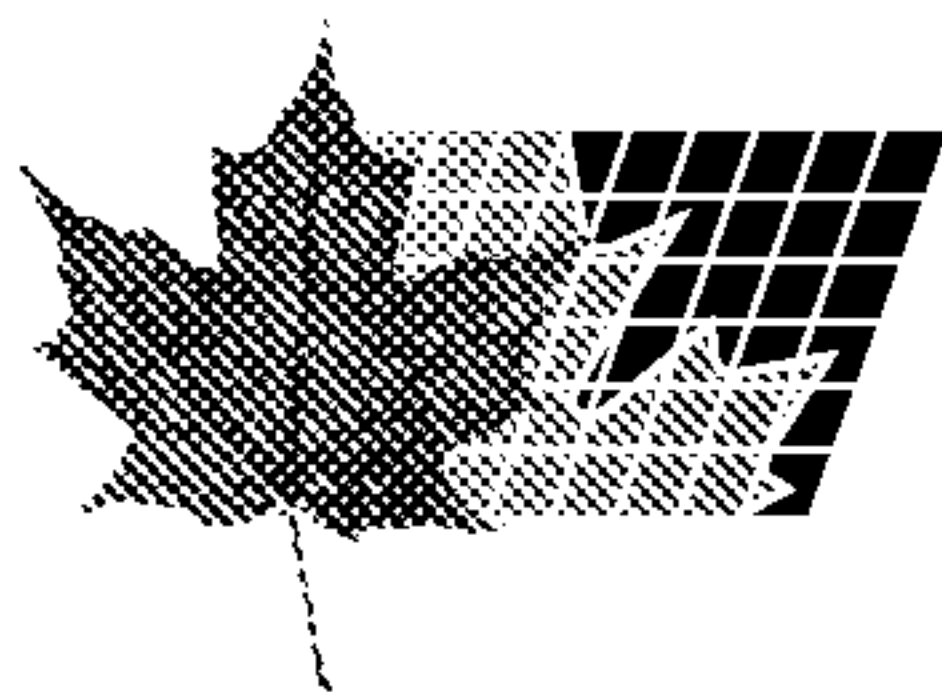




(11) (21) (C) **2,271,579**
(22) 1989/10/12
(43) 1990/05/04
(45) 2000/06/13
(62) 2,000,593
(22) 1989/10/12

(72) SIEGMUND, HELMUT DIETER, DE

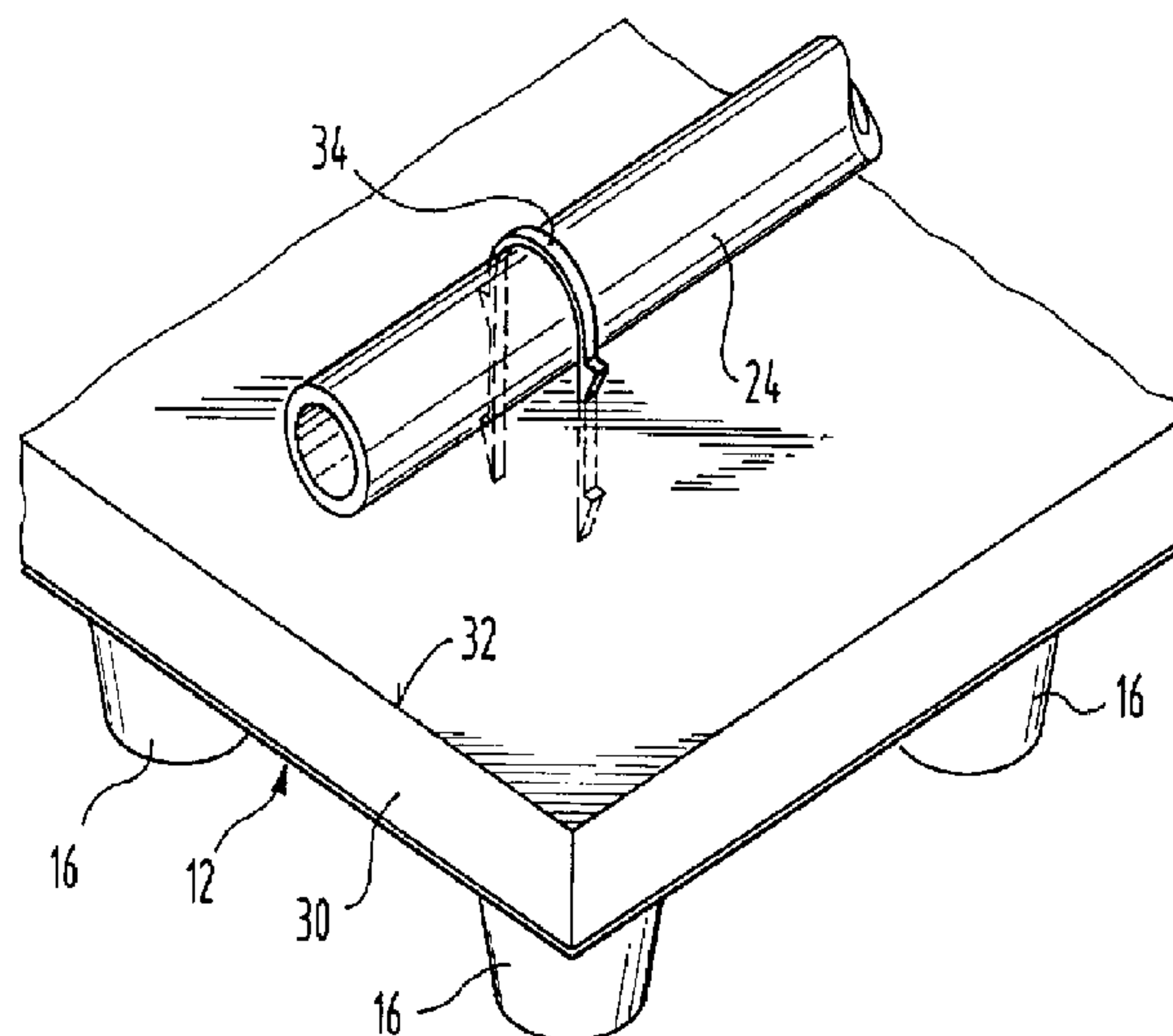
(73) EHT SIEGMUND GMBH, DE

(51) Int.Cl.⁶ H05B 3/02

(30) 1988/11/04 (P 38 37 562.1) DE

(54) **ELEMENTS CHAUFFANTS POUR PLANCHER CHAUFFANT
CREUX**

(54) **SURFACE ELEMENT FOR A HEATABLE FLOOR WITH
HOLLOW SPACES**



(57) A surface heating element for placement on a sub-floor and for making a heatable hollow space floor includes a plastic sheet having deep drawn protuberances forming spacers strengthened by ceramic support bodies or by a hardened finish material. The same sheet, or a second sheet connected to it, forms a carrier plate for carrying hot water tubes or other heating elements. The carrier plate may include deep drawn dogs, extending in a direction opposite to the protuberances, for holding the heating elements to the carrier plate; and a hardened finish may be used to embed the heating elements.

ABSTRACT OF THE DISCLOSURE

A surface heating element for placement on a sub-floor and for making a heatable hollow space floor includes a plastic sheet having deep drawn protuberances forming spacers strengthened by ceramic support bodies or by a hardened finish material. The same sheet, or a second sheet connected to it, forms a carrier plate for carrying hot water tubes or other heating elements. The carrier plate may include deep drawn dogs, extending in a direction opposite to the protuberances, for holding the heating elements to the carrier plate; and a hardened finish may be used to embed the heating elements.

SURFACE ELEMENT FOR A HEATABLE FLOOR WITH HOLLOW SPACES

The invention concerns a surface element for a heatable
5 floor with hollow spaces, in which a spacer plate lies on a
sub-floor with spacer elements distributed over its surface
and in which heating elements of a surface heating arrangement
are located between the upper floor and the spacer plate.

10 In a floor with hollow spaces of the previously mentioned
type, known from DE-PS 32 17 498, the spacer plate consists of
two plastic sheets between which closed nubs forming air
cushions are arranged as spacer elements. After the transfer
of this spacer plate to the sub-floor, the surface so formed is
15 treated as a customary sub-floor with regard to the placement
of the in-floor heating. The mentioned spacer plate has the
disadvantage that it possesses no great carrying capacity.
With the conduction of warm air through the hollow spaces
formed between the spacer elements together with a simultaneous
20 high loading of the floor, there exists the danger that
the walls of the air cushions will be deformed or indeed torn
and that the upper floor will then sink. This is particularly
true of the floor's behavior in the case of a fire.
Consequently, the installation of such a heatable hollow space

floor requirements a double work effort, since first the spacer plates are set and subsequently the heating arrangement must be installed.

5 The invention has as its object, the provision of a simple to install surface element of the initially mentioned type that has a high carrying capacity and which also does not allow the upper floor to sink under a condition of high heating.

10 This object is solved in accordance with the invention in that the spacer plate comprises a plastic sheet wherein the spacer elements are formed as deep drawn protuberances, which are strengthened by ceramic supporting bodies, and in that the plastic sheet is connected on its flat side facing away from the protuberances with a carrier plate for the heating elements. The ceramic supporting bodies can be inserted in the recesses formed by
15 the protuberances either as massive elements or as cup-shaped elements, or the ceramic supporting bodies can be hollow bodies placed over the protuberances. The insertion of the supporting bodies into the recesses of the protuberances has the advantage that the supporting bodies can be held fast and accordingly pre-
20 assembled by the carrier plate fastened to the sheet. In both cases, nevertheless, the supporting bodies constitute the supporting elements of the spacer plate, with the ceramic material withstanding high temperatures as well as a high pressure loading.

During the connection of the carrier plate with the spacer plate both can be placed in accordance with such a work process that the required work is no greater than in the case of the placement of a customary in-floor heating arrangement.

5 With respect to manufacturing techniques, it is practical for the protuberances and for the supporting bodies to have the shape of truncated cones.

 According to a preferred embodiment of the invention, the support plate is formed of a second plastic sheet in which clamping
10 dogs are formed for holding the heating elements. In this case, the two plastic sheets can be directly welded or glued to one another. There exists also the possibility that a heat insulating layer can be arranged between the two plastic sheets, if it is strived for that the heating elements are to be isolated from the
15 hollow space, as described in DE-PS 32 17 498. In place of the second plastic sheet, a heat insulation plate laminated with a holding sheet can also be provided to which the heating elements, such as for example hot water conducting heating pipes, are fastened with holding clamps.

20 Instead of a plastic sheet including the spacer elements and another plastic sheet including the clamping dogs for the heating elements, there can also be provided a single plastic sheet in which the spacer elements are formed outwardly from

one side in the form of protuberances and in which the clamping dogs are formed outwardly from the other side by deep forming. In this case, also, the spacer elements can be strengthened by ceramic supporting bodies as in the previously described solution. Instead of a strengthening by ceramic supporting bodies, however, a liquid finish can be applied to the side of the sheet containing the clamping dogs after the insertion of the heating tubes, which finish fills the recesses formed by the protuberances and after hardening not only embeds the heating tubes but also forms the spacer elements. The plastic sheet requires, in this case, to be only so strong that it can serve on one hand as a mold for the casting of the spacer elements and, on the other hand, to hold the heating tubes in place until the finish is hardened.

The following description explains the invention in connection with the accompanying drawings by way of exemplary embodiments. The drawings show:

Fig. 1 - A schematic cross-section through a hollow space floor with a surface element according to a first embodiment of the invention.

Fig. 2 - A perspective partial illustration of a surface element according to a second embodiment of the invention.

Fig. 3 - A perspective view of the manufacture of the spacer plate providing plastic sheet according to a third embodiment of the invention.

5 Fig. 4 - A section corresponding to Fig. 1 through a hollow space floor using the plastic sheet of Fig. 3.

10 In Fig. 1, a spacer plate 12 is arranged on a sub-floor 12 and consists of a plastic sheet 14 in which protuberances 16 of truncated cone shape are formed by deep drawing, which protuberances are distributed with regular spacing over the entire surface of the spacer plate 12. In the recess formed by each protuberance 16, is inserted a ceramic supporting body 18 having a shape suiting that of the protuberance, which supporting body can be made as a solid piece of material or
15 can also be made as a cup-shaped hollow body, as indicated in the middle of one spacer element by the broken lines. On the upper side of the plastic sheet 14 is arranged a further plastic sheet 20 which is welded, glued or connected in some other way to the first plastic sheet. In the plastic sheet 20
20 are clamping dogs 22, formed by deep drawing, between which the heating tubes 24 of an in-floor heating arrangement are placed. The plastic sheet 20 carries a finish 26 which embeds the heating tubes 24 and which is covered by a floor layer 28. The surface element consisting of the spacer plate 12 and of
25 the carrier plate formed by plastic sheet 20 can be laid in

its entirety on the sub-floor 10 and can be connected with neighboring surface elements, for example by use of compression fasteners or in other ways.

In the case of the embodiment illustrated in Fig. 2, the spacer plate 12 is formed in the same way as has been described in connection with Fig. 1. The carrier plate, lying on the spacer plate 12, consists of a heat insulating layer 30, which for example, consists of polyurethane rigid foam laminated with a supporting sheet 32. To this carrier plate, the heating tubes 24 are securely fastened with the help of clamps 34 sticking through the supporting sheet 32, as is in itself known. In this case, the carrier plate can also be glued to the spacer plate so that the surface element so formed can be installed as a single unit.

As is known, a surface element so formed has a high carrying capacity which is not lost in the case of a fire. A heatable hollow space floor can be constructed wherein, because of the formation of the surface element either with an isolation layer between the carrier plate and the spacer plate or without an isolation layer between the two plates, different possibilities for a combination of in-floor heating with a ventilating or warm air apparatus are possible.

Whereas, in the embodiment of Fig. 1, two plastic sheets 14 and 20 are used for holding the ceramic supporting bodies

and for holding the heating tubes, in the case of the embodiment of Fig. 3 only a single plastic sheet 36 is provided in which from one side the truncated cone recesses or protuberances 38 are provided by deep forming and on the other side clamping dogs 40 are formed by deep forming for holding the heating tubes. This sheet can be used in the same way as the two sheets of Fig. 1. That is, ceramic supporting bodies can be inserted in the recesses 38 as described in connection with Fig. 1. In accordance with the solutions of Figs. 3 and 4, one can also, however, spare the insertion of the ceramic supporting bodies since the heating tube 24 embedding finish 42 upon application will also enter the recesses 38 and completely fill them. After hardening, the finish then forms the actual spacer elements, the protuberances 38 of the sheet 36 serving only as molds for the casting of the spacer elements.

C L A I M S

1. A floor element for a heatable cavity floor, in which element a spacer panel having spacer elements distributed over its surface rests on a sub-floor, heating elements of a surface heating system being disposed between an over-floor and the spacer panel, the spacer panel comprising a plastic sheet having deep-drawn projections which form the spacer elements and which are reinforced by ceramic support members, and the plastic sheet being connected to a carrier panel for the heater elements on its flat side remote from the projections.
2. A floor element according to claim 1, wherein the ceramic support members are disposed in the recesses formed by the projections.
3. A floor element according to claim 1, wherein the ceramic support members surround the projections.
4. A floor element according to claim 1, wherein the carrier panel is formed by a second plastic sheet in which clamping dogs are formed for mounting the heating elements.
5. A floor element according to claim 4, wherein the two plastic sheets are welded or stuck together.

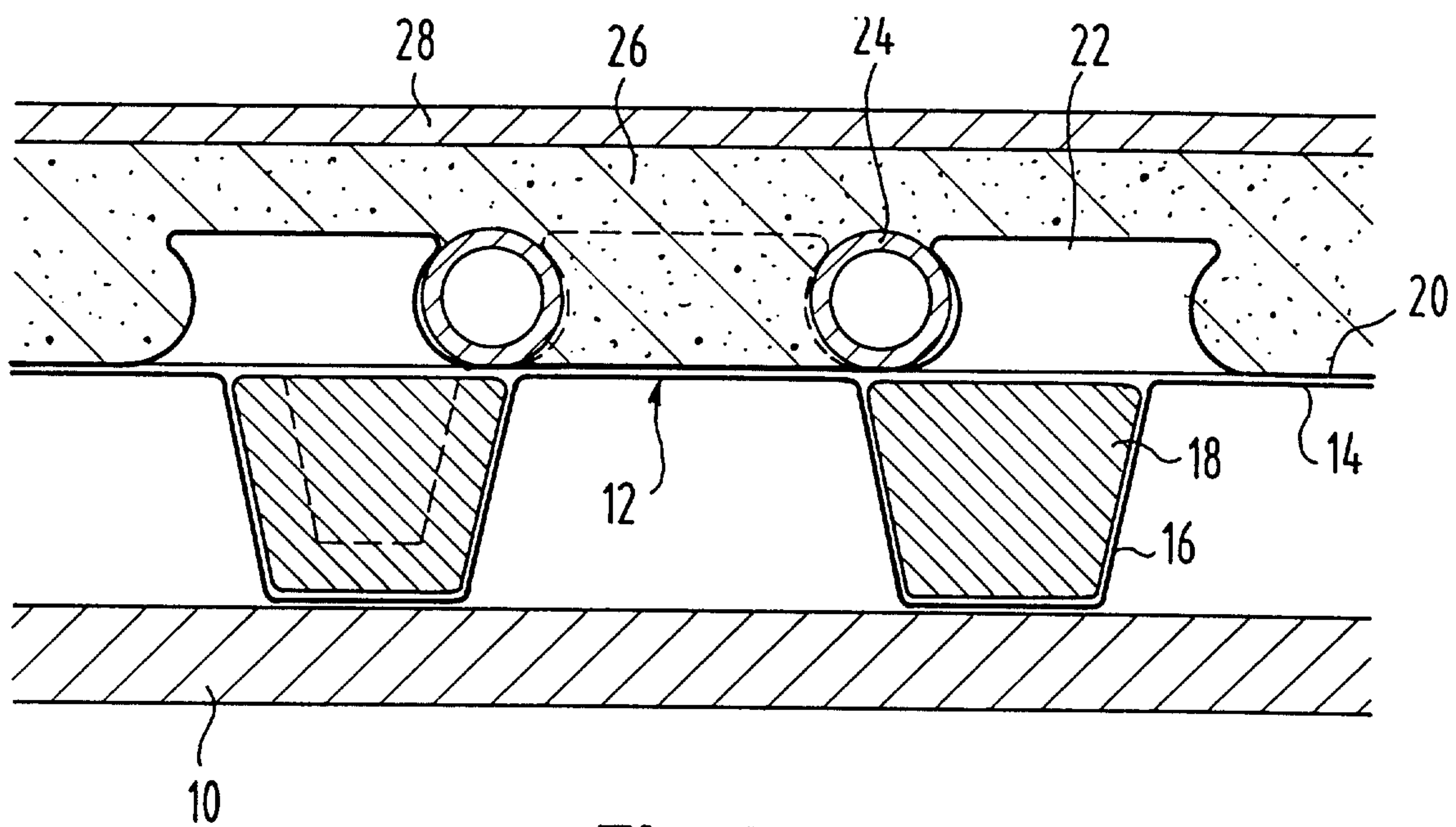


Fig. 1

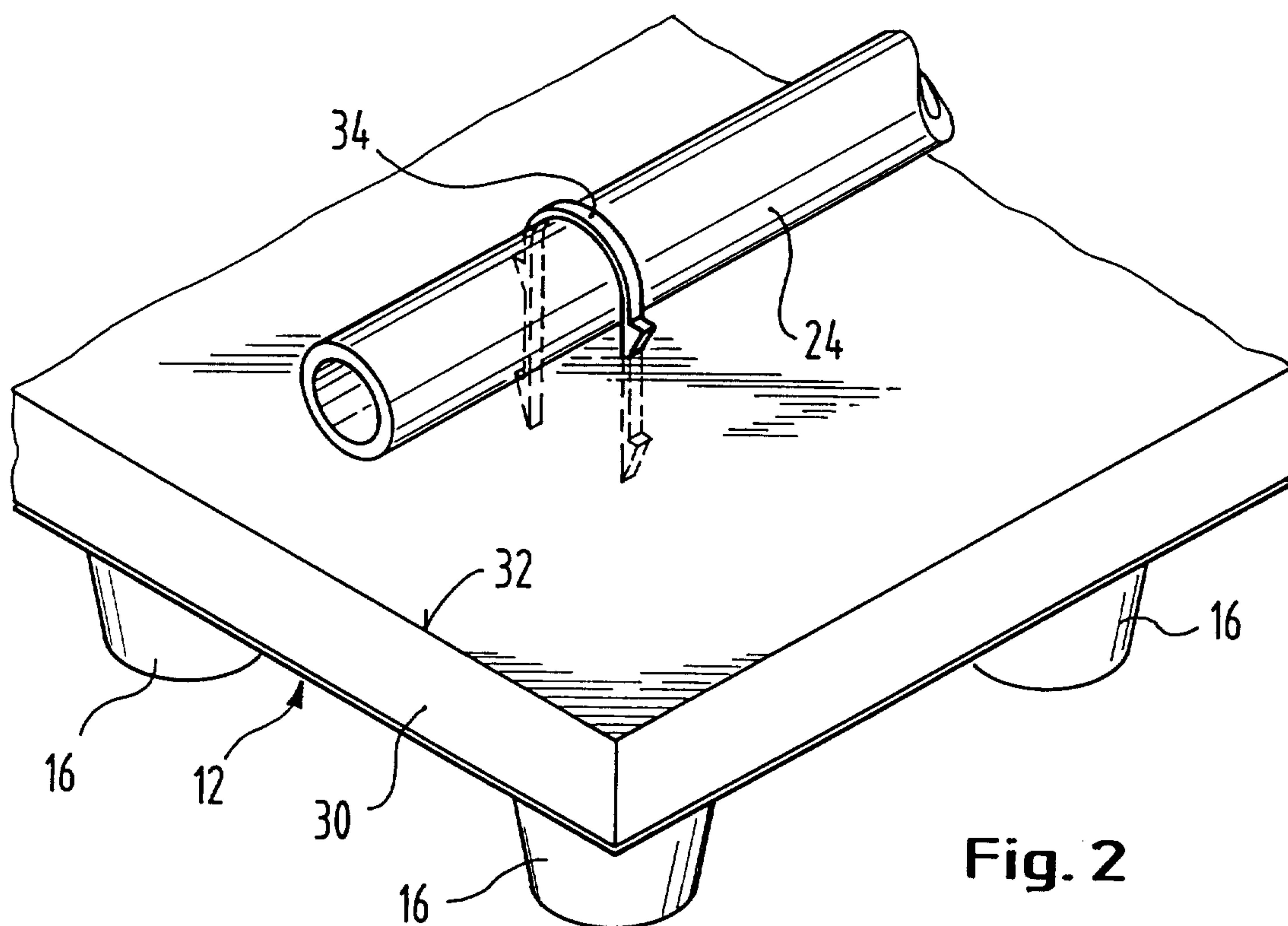


Fig. 2

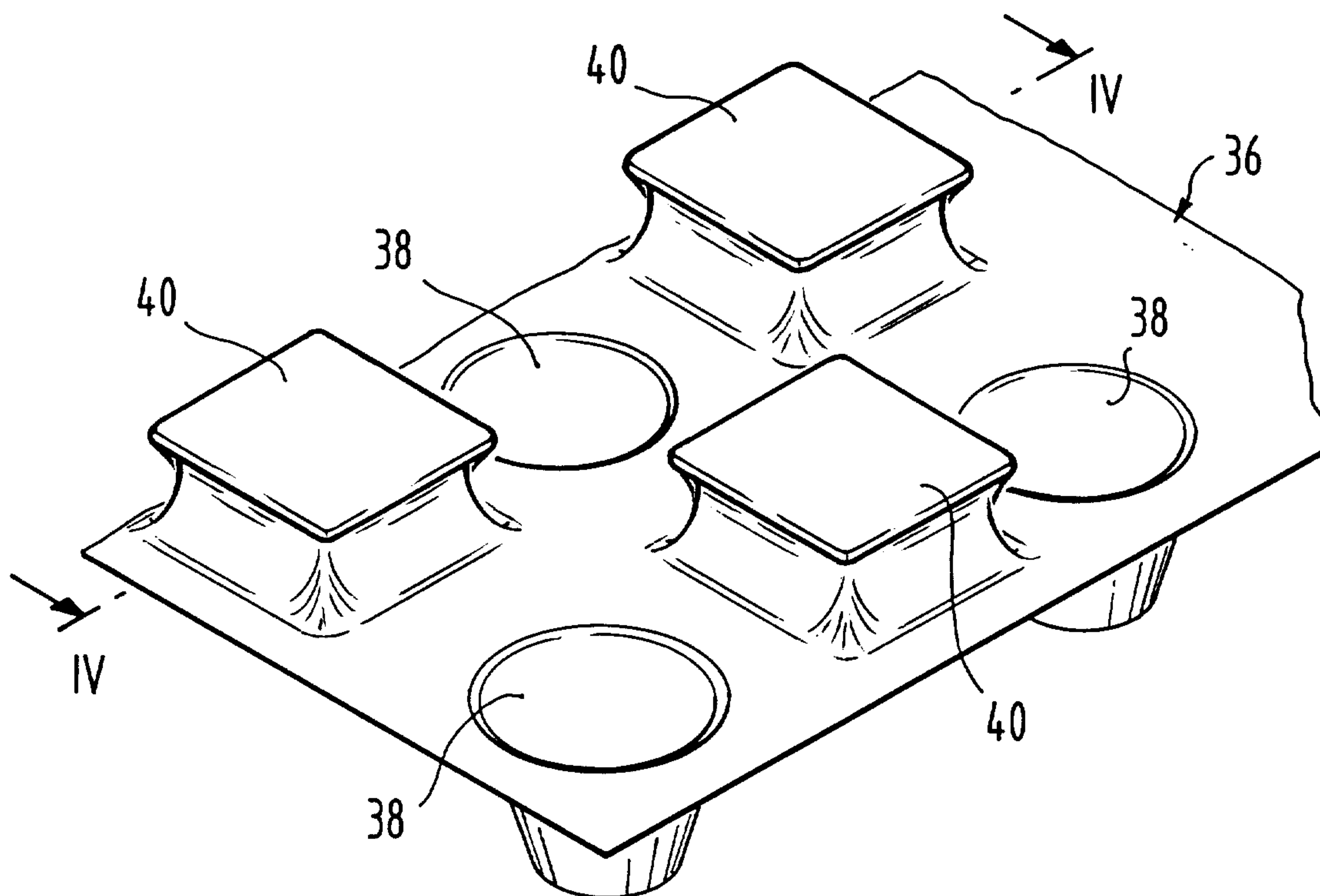


Fig. 3

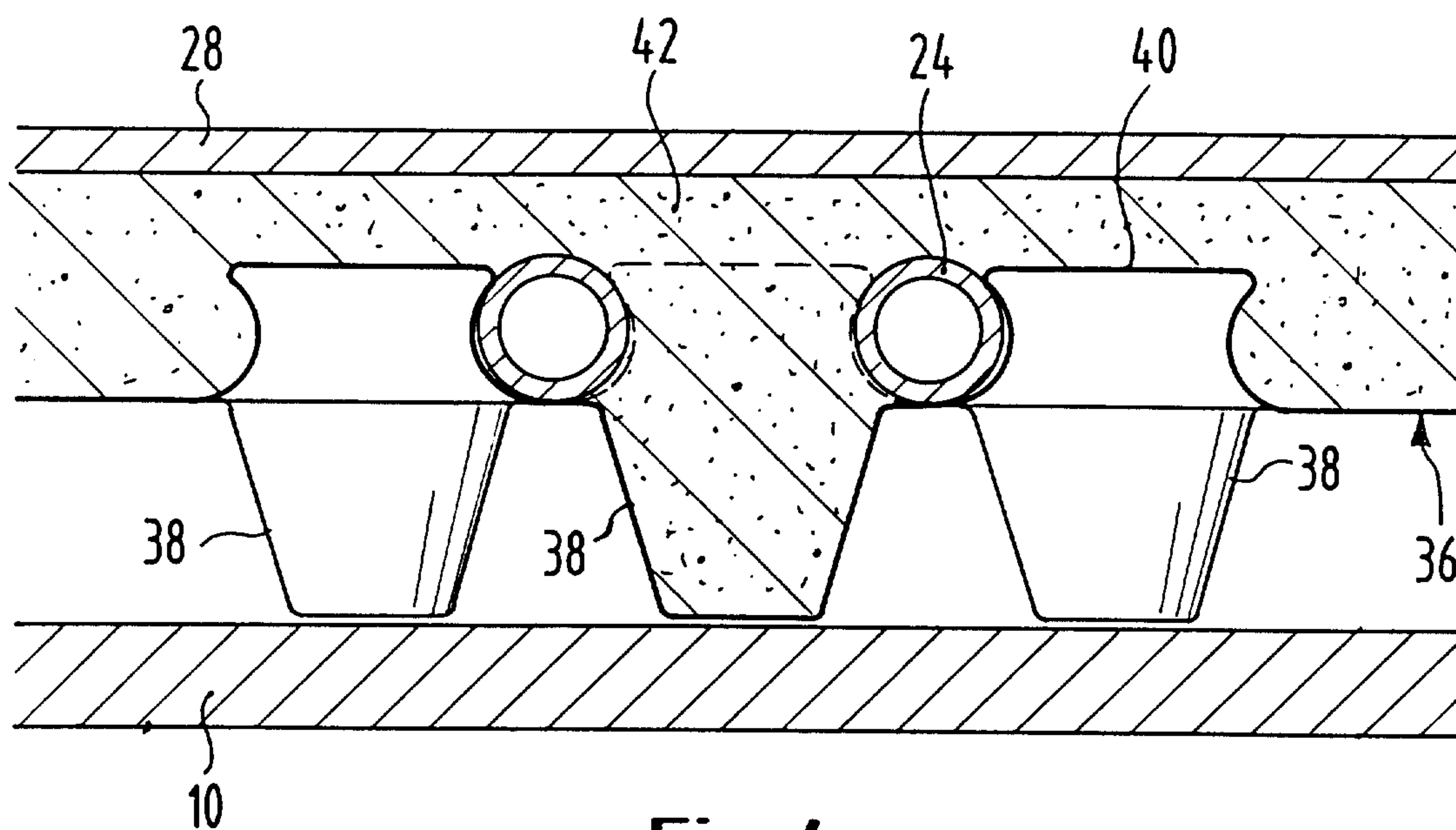


Fig. 4